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# FORD MOTOR COMPANY

FLAT ROCK, MICHIGAN

#### FLAT ROCK ASSEMBLY PLANT (FRAP): **RCO OCM TEST REPORT**

RWDI #2300558 January 19, 2023

#### SUBMITTED TO

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## **EXECUTIVE SUMMARY**

RWDI USA LLC (RWDI) has been retained by Ford Motor Company (Ford) to complete the emission sampling program at the Flat Rock Assembly Plant (FRAP) located at 1 International Drive, Flat Rock, Michigan. FRAP operates an automobile assembly plant that produces the Ford Mustang. The testing evaluated volatile organic compound (VOC) concentrations at the outlet of three (3) regenerative catalytic oxidizers (RCO). The test program was completed on December 7<sup>th</sup>, 2022.

Executive Table i: RCO Average

Parameter	Concentration				
	RCO A	RCO B	RCO C	Average	
Outlet VOC (as propane)	5.3 ppmv	4.1 ppmv	1.9 ppmv	3.8 ppmv	

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## **1** INTRODUCTION

RWDI USA LLC (RWDI) has been retained by Ford Motor Company (Ford) to complete the RCO Outlet Concentration Monitoring (OCM) emission sampling program at the Flat Rock Assembly Plant (FRAP) located at 1 International Drive, Flat Rock, Michigan. FRAP operates an automobile assembly plant that produces the Ford Mustang. The testing evaluated volatile organic compound (VOC) concentrations at the outlet of three (3) regenerative catalytic oxidizers (RCO).

#### 1.1 Location and Dates of Testing

The test program was completed on December 7<sup>th</sup>, 2022 at the Ford FRAP facility.

#### **1.2 Purpose of Testing**

FRAP requires periodic monitoring of the VOC concentration of exhaust from each of the three (3) RCOs.

### **1.3 Description of Source**

Vehicle body panels are stamped and assembled on site from sheet metal components. The bodies are cleaned, treated, and prepared for painting in the phosphate system. Drawing compounds, mill oils, and dirt are removed from the vehicle bodies utilizing both high pressure spray and immersion cleaning/rinsing techniques. Vehicle bodies are then dip coated in electro deposition corrosion primer paint for protection. The electro primer (e-coat) is heat cured to the vehicle body in a high-temperature bake oven. After completing the e-coat operation, vehicle bodies are conveyed to the sealer area for application of various sealants to body seams and joints. Vehicle bodies are then conveyed to an oven to cure the sealers.

After the sealer oven, the vehicles are routed to one of the two identical 3-wet paint systems. In the booth, the vehicles are painted with primer, a color basecoat, and a protective clearcoat layer using automatic bells on robot spray applicators. The vehicles are then passed through an oven to cure the 3-wet applications. The 3-wet booths allow for paint application of one layer after the other without the intermediate drying stage.

The vehicle paint process includes the e-coat priming (guidecoat) surface priming, base/clearcoat and vehicle sealing operations. The majority of the process emissions associated with these coating activities are oxidized at elevated temperatures by the RCO and RTO emission control equipment.

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### 3.3 Type and Quantity of Raw and Finished Materials

The units associated with this process are EGECOAT, EGGUIDECOAT/EGTOPCOAT, and EGCOAT. These include body sealing agents, top/basecoat color paints, protective coatings, and electro deposition primer.

### 3.4 Normal Rated Capacity of Process

The plant was operating at normal production for most of the testing.

#### 3.5 Process Instrumentation Monitored During the Test

The RCO temperature was monitored during the test.

## 4 SAMPLING AND ANALYTICAL PROCEDURES

### 4.1 Description of Sampling Train and Field Procedures

#### 4.1.1 Sampling for Volatile Organic Compounds - USEPA Method 25A

VOC testing was performed simultaneously on outlet of each RCO. The measurements were taken continuously following the USEPA Method 25A on the outlet on each RCO concurrently (using a non-methane/methane analyzer). As outlined in Method 25A, the measurement location was taken at the centroid of each source.

The testing program consisted of a three (3) test of at least 30-minutes on each RCO outlet at the preferred temperature. Regular performance checks on the CEMS were carried out by zero and span calibration checks using USEPA Protocol calibration gases. These checks verified the ongoing precision of the monitor with time by introducing pollutant-free (zero) air followed by known calibration gas (span) into the monitor. The response of the monitor to pollutant-free air and the corresponding sensitivity to the span gases was reviewed frequently as an ongoing indication of analyzer performance.

Prior to testing, a 4-point analyzer calibration error check was conducted using USEPA protocol gases. The calibration error check was performed by introducing zero, low, mid, and high-level calibration gases up the heated line to the probe tip. The calibration error check was performed to confirm that the analyzer response is within ±5% of the certified calibration gas introduced. At the conclusion of each test run a system-bias check was performed to evaluate the percent drift from pre- and post-test system bias checks. The system bias checks were used to confirm that the analyzer did not drift greater than ±3% throughout a test run.

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# 5 TEST RESULTS AND DISCUSSION

### 5.1 Detailed Results

Table 5.1.1: Table of Results

	Concentration				
Parameter	RCO A	RCO B	RCO C	Average	
Outlet VOC (as propane)	5.3 ppmv	4.1 ppmv	1.9 ppmv	3.8 ppmv	

Detailed Results are provided in Appendices B and F and Graphs 1 to 3.

### 5.2 Discussion of Results

Average of the three (3) RCO outlets were less than 5 ppm VOC (THC minus methane).

### 5.3 Variations in Testing Procedures

Only variation to the original program is that RWDI completed the testing of all three (3) RCOs concurrently. Therefore, in order to obtain three different time periods, triplicate tests were completed on each RCO, each consisting of a minimum of 45 minutes.

### 5.4 Process Upset Conditions During Testing

There were normal process breaks during production.

### 5.5 Maintenance Performed in Last Three Months

For the testing, the RCOs temperature average temperatures were as follows:

- RCO A 1222°F
- RCO B 1321°F
- RCO C 1152°F

### 5.6 Re-Test

This was not a retest.

### 5.7 Audit Samples

This test did not require any audit samples.



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#### Table 1: VOC EMISSIONS TABLE

Source: RCO A, B and C RWDI Project # 2300558

Parameter	Test 1 (RCOA)	Test 2 (RCOB)	Test 3 (RCOC)	Average
Date	7-Dec-22	7-Dec-22	7-Dec-22	
Start Time:	6:40	7:50	9:05	
Stop Time:	7:25	8:35	9:50	
Duration (mins):	45	45	45	
THC Concentration (as propane) ppm:	46.6	12.6	8.9	22.7
THC Concentration (as propane) ppm corrected per Method 7E:	46.5	12.0	8.2	22.2
CH4 Concentration (as methane) ppm:	96.3	18.9	15.0	43.4
CH4 Concentration (as methane) ppm corrected per Method 7E:	96.8	18.7	14.9	43.5
CH4 Concentration (as propane) ppm corrected per Method 7E:	41.2	7.9	6.3	18.5
VOC Concentration (minus methane) ppm corrected per Method 7E:	5.3	4.1	1.9	3.8
Response Factor:	2.35	2.37	2.35	2.36



## GRAPHS













# FIGURES

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Figure 1 Flat Rock Assembly Plant Abatement System Layout and Sampling Locations

